Space Weather Forecast

Issued on Saturday, 10 February 2024 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Current Moderate Solar Radiation Storm likely declining. Further Minor/Moderate Radio Blackouts Likely. Chance of G1/G2 conditions day 3 (12 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High over the past 24 hours, with one major Strong class flare observed at 09/1314UTC, associated with an active region which now lies over the southwestern limb. Three Moderate-class flares were also observed. There are currently nine regions on the visible disc, three of which are unnumbered. AR3576 remains the dominant spot in terms of complexity and size. There continues to be slight development in the collections of spots on its leading northern edge, there are also at least three delta regions evident in the intermediate region. Magnetic looping suggests a lack of tight and complex fields though, likely the reason for the lack of large flares from this region. All other spots are relatively simple and unremarkable. Two new regions have appeared on the disk, a simple Hsx region which has rotated around the limb and a small Cro in the northeast.

Two potentially Earth-directed coronal mass ejections CMEs were observed. One shock from the strong-class flare and a coronal mass ejection from near south-centre disk associated with a potential filament disturbance around 0700 on 10 Feb. Analysis of this eruption is still taking place.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of a weak CME arrival around 09/2140 UTC. Slightly Elevated winds speeds fell to background before becoming slightly elevated once again around 09/2140UTC, before falling back to background by the end of the period. The IMF generally weak but briefly peaking into moderate levels with the CME arrival. The north-south component varying weakly, and largely positive following CME arrival. Geomagnetic activity generally Quiet, but with Unsettled condition (Kp3) recorded following the CME arrival.

Energetic Particles / Solar Radiation: Solar radiation levels rose steadily following the Strong flare, rising above S1 Minor Strom levels (10pfu) from 09/1549UTC and S2 Moderate Storm levels (100pfu) from 09/1815UTC, where despite some slight fluctuations it remains.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate X-ray flare activity likely, and a slight chance of further Strong-class activity a slight chance, with the very large region near centre disk providing the vast majority of the risk as the active region responsible for the strong flare on the 09 Feb continues to rotate further onto the far side of the disk.

Solar Wind / Geomagnetic Activity: There are up to 3 coronal mass ejections which currently feature in the forecast, all perhaps enhancing the solar wind environment on day 2 (12 Feb). The first is a coronal mass ejection from 08 Feb arriving around 12/1200UTC. The second is associated with the potential shock effects from the strong flare, perhaps with effects anytime

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between 11/0900-12/2359 UTC. Finally there was an eruption near south-centre disk on 10 Feb, with possible arrival any time from early on day 3 (12 Feb). Confidence is low for each ejection at this point in time. No coronal hole fast wind enhancements are expected.

Quiet to Unsettled conditions are expected to start. The shock from the strong flare brings a slight chance of G1 conditions on day 2 (11 Feb), with this becoming a chance of G1/G2 on day 3 (12 Feb) and an outside chance of a G3 should all three possible corona mass ejections arrive in quick succession. Lingering effects are possible by day 4 (13 Feb), though overall geomagnetic activity should fall back to Quiet to Unsettled with a chance of Active.

Energetic Particles / Solar Radiation: Solar radiation levels currently at S2 Moderate Solar Radiation Storm levels following earlier enhancement from the Strong flare on 09 Feb. Solar radiation levels should begin to subside through the period, though likely remaining above S1 and perhaps S2 through day 1 (10 Feb), with a gradual fall to below S1 levels possibly by day 3 (12 Feb).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	40	10
Strong	G3	No	1	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	Yes	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	99	80	30	20
Very Active	≥ S3 *	No	10	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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